



# **Multi-Path I/O (MPIO) Driver Program**

## **User's Manual**

On Microsoft® Window® 2003 Platform

Version 1.0 (07, 2005)

## Contact Information

### **Asia Pacific**

#### **(International Headquarters)**

Infortrend Technology, Inc.  
8F, No. 102 Chung-Shan Rd., Sec. 3  
Chung-Ho City, Taipei Hsien, Taiwan  
Tel: +886-2-2226-0126  
Fax: +886-2-2226-0020  
[sales@infortrend.com.tw](mailto:sales@infortrend.com.tw)  
[support@infortrend.com.tw](mailto:support@infortrend.com.tw)  
<http://www.infortrend.com.tw>

### **Americas**

Infortrend Corporation  
3150 Coronado Dr., Unit C  
Santa Clara, CA 95054  
USA  
Tel: +1-408-988-5088  
Fax: +1-408-988-6288  
[sales@infortrend.com](mailto:sales@infortrend.com)  
[tsd@infortrend.com](mailto:tsd@infortrend.com)  
<http://www.infortrend.com>

### **China**

Infortrend Technology, Limited  
Room 1210, West Wing, Tower One,  
Junefield Plaza, No. 6 Xuanwumen Street,  
Xuanwu District, Beijing, China  
Post code: 100052  
Tel: +86-10-6310-6168  
Fax: +86-10-6310-6188  
[sales@infortrend.com.cn](mailto:sales@infortrend.com.cn)  
[support@infortrend.com.cn](mailto:support@infortrend.com.cn)  
<http://www.infortrend.com.cn>

### **Europe (EMEA)**

Infortrend Europe Limited  
5 Elmwood Chineham Business Park  
Basingstoke, Hampshire  
RG24 8WG, UK  
Tel: +44-1256-70-77-00  
Fax: +44-1256-70-78-89  
[sales@infortrend-europe.com](mailto:sales@infortrend-europe.com)  
[support@infortrend-europe.com](mailto:support@infortrend-europe.com)  
<http://www.infortrend-europe.com>

### **Japan**

Infortrend Japan, Inc.  
6F Okayasu Bldg., 1-7-14 Shibaura,  
Minato-ku, Tokyo, 105-0023 Japan  
Tel: +81-3-5730-6551  
Fax: +81-3-5730-6552  
[sales@infortrend.co.jp](mailto:sales@infortrend.co.jp)  
[support@infortrend.co.jp](mailto:support@infortrend.co.jp)  
<http://www.infortrend.co.jp>

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**This Edition First Published 2005**

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## About This Manual

This manual:

- Introduces the multi-path I/O software.
- Provides recommendations and details about the MPIO installation process.
- Briefly describes how to use the MPIO.

This manual does not:

- Contain information on RAID configurations
- Give a detailed description of the RAID processing units or the RAID controllers embedded within the subsystem.

## Who should read this manual?

This document is intended for system administrators who want to set up MPIO in a storage network, using Infortrend's EonStor<sup>®</sup> RAID subsystems or EonRAID<sup>®</sup> 2510FS controller head.

## Related Documentations

- Generic Operation Manual (Version 1.69 or above)
- RAIDWatch<sup>®</sup> User's Manual (Version 2.2 or above)
- Installation and Hardware Reference Manual. This user's manual is based on:
  - ES A12E-G2121 Installation and Hardware Reference Manual (Version 1.0)
  - ES A16F-R2221 Installation and Hardware Reference Manual (Version 1.4)

These documents are located in the product CD included with your subsystem package

## Conventions

### Naming

From this point on and throughout the rest of this manual, the EonStor series is referred to as simply the "subsystem" or the "system" and EonStor is frequently abbreviated as "ES."

### Lists

**Bulleted Lists:** Bulleted lists are statements of non-sequential facts. They can be read in any order. Each statement is preceded by a round black dot "•."

**Numbered Lists:** Numbered lists describe sequential steps you should follow in order.

Important information that users should be aware of is indicated with the following icons:



**NOTE:**

*These messages inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can help you avoid making mistakes.*

---



**CAUTION!**

*Cautionary messages should also be heeded to help you reduce the chance of losing data or damaging the system.*

---



**IMPORTANT!**

*Important messages pertain to the use of the hardware, software and firmware introduced in this manual.*

---



**WARNING!**

*Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously.*

---

# Chapter 1

## Introduction

### 1.1 MPIO Overview

Infortrend participates in the Microsoft's Multi-path I/O (MPIO) driver program and develops a set of own drivers to facilitate the MPIO solution running on the variety of RAID storage systems. Infortrend focuses on leveraging the combined expertise of Microsoft to create solutions that servers can employ multiple data connections between host and storage for improved availability.

With a single storage connection, any controllers, disk drives, interconnect hardware, or host bus adapters can become a single point of failure and potential performance bottleneck in the storage subsystem. Redundant hardware, advanced RAID technology, and failover capabilities are used to enhance fault tolerance and availability. Install this MPIO driver program extends redundancy to the entire I/O path, delivering load balance, fault tolerance, high availability, and better performance.

### 1.2 Supported Hardware

The MPIO driver program is designed for use with ASIC266 platform implemented, EonStor Fibre-to-Fibre, Fibre-to-SATA and iSCSI-to-SATA series of RAID subsystems or Fibre-to-Fibre controller head. For the MPIO driver installation procedures, please refer to **Chapter 2** of this manual.

### 1.3 Installation Prerequisites

#### 1.3.1 Environmental Prerequisites

- The hosts must have at least two (2) connections to the network, plus MPIO software to create and manage the connections in a manner consistent with the operating system.
- If a Fibre SAN environment is being adopted, redundant, high-bandwidth network switches are required.

- The host computers should be running Microsoft Windows 2003, Service Pack 1.
- If you are using ES Fibre series RAID subsystems, or ER 2510FS controller head, the Fibre HBA card and its driver should be installed to the host computer prior to the MPIO program installation. To install a Fibre HBA card and driver, please refer to the user's manual that came with your HBA card.
- If you are using ES iSCSI series RAID subsystems, either an iSCSI HBA card along with its driver or an Ethernet card should be installed to the host computer prior to the MPIO program installation.
  - When an iSCSI HBA card is used, the iSCSI initiator may or may not be required to install to the host computer. To install an iSCSI HBA card, driver and be sure of any special requirements, please contact your iSCSI HBA card vendor or refer to the user's manual that came with your card.
  - When an Ethernet card is used, the iSCSI initiator program **MUST** be installed. The iSCSI initiator installation procedures are fully described in **Appendix A** of this user's manual.
- Firmware version 3.42x or above must be running on your RAID subsystem.



#### **WARNING!**

*The firmware version installed on your subsystem should provide the complete functionality listed in the specification sheet/user's manual. We provide special revisions for various application purposes. Therefore, DO NOT upgrade your firmware unless you fully understand what a firmware revision will do.*

---



#### **NOTE:**

*Please contact your system vendor or visit Infortrend's FTP site (<ftp.infortrend.com.tw>) for the latest software or firmware updates.*

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#### **IMPORTANT!**

*Problems that occur during the updating process may cause unrecoverable errors and system down time. Always consult technical personnel before proceeding with any firmware upgrade.*

---



### 1.3.2 Hardware Prerequisites

- All modules in the storage subsystem should be redundant and hot-swappable to eliminate any single point of failure.
- To create dual-path redundancy in Fibre storage network, using at least two (2) single-port Fibre HBA cards or one (1) dual-port Fibre HBA card on the host computer.
- In an iSCSI storage network, iSCSI HBA card or Ethernet card should be installed on the host server. The card should provide at least two ports. Otherwise, two iSCSI HBA cards or Ethernet cards should be used to create dual-path redundancy.

**NOTE:**

*Some of the host computer comes with onboard Ethernet card. If the onboard Ethernet card provides two or more Ethernet ports and is used, no additional iSCSI HBA card or Ethernet card is required.*

---

- Before installing the MPIO program, the RAID subsystem should be created at least one logical drive and mapped to one or more LUN. Otherwise, using the firmware that came with Infortrend RAID subsystem and set the controller-host side parameter - peripheral parameter ==>Peripheral device type: oxd; LUN applicability: LUN-0's.

**NOTE:**

*For logical drive creation, LUN mapping and Firmware configuration, please refer to the **RAIDWatch User's Manual** or **Generic Operation Manual** that came with your RAID subsystem.*

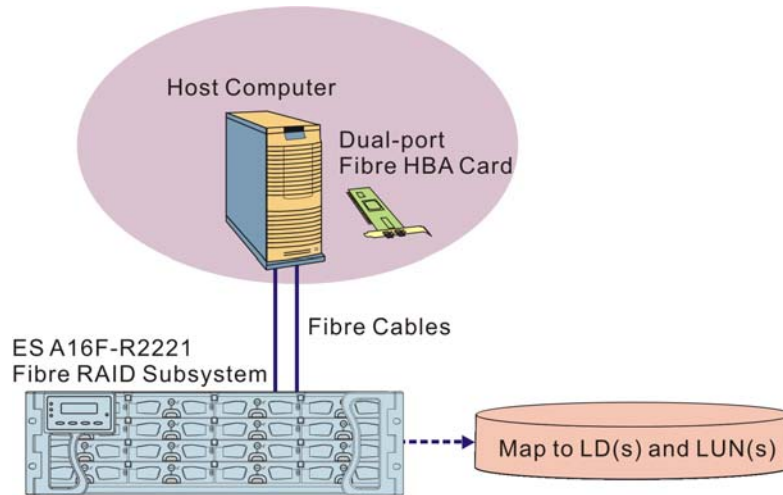
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- Two or more paths should be created to connect the RAID subsystem to the host computer. For iSCSI series connection, be sure to set the Netmask to “**255.255.255.0**.” All paths should have different subnets.

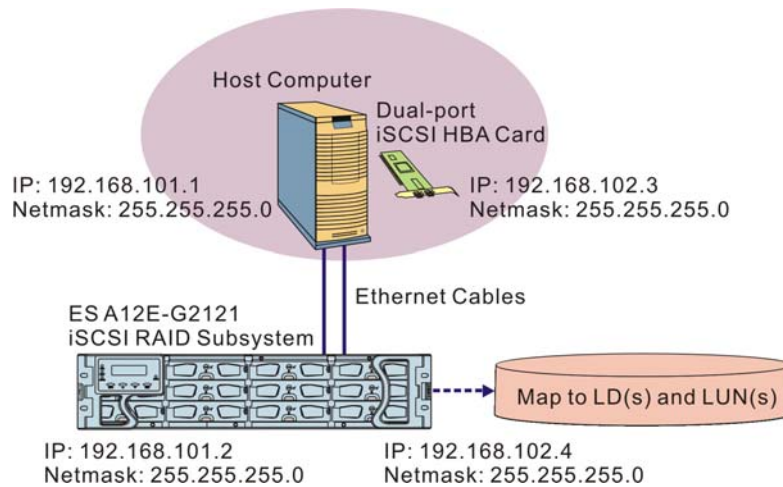
## 1.4 Sample Models

The following chapter and appendix will describe the installations of the MPIO program and iSCSI initiator. The Fibre channel example used in this manual is using ES A16F-R2221 RAID subsystem. For the iSCSI channel installation, the demonstration is using ES A12E-G2121 RAID subsystem. One host computer is connecting to each RAID subsystem. The Fibre HBA, iSCSI HBA and Ethernet card are applied in three different configurations.

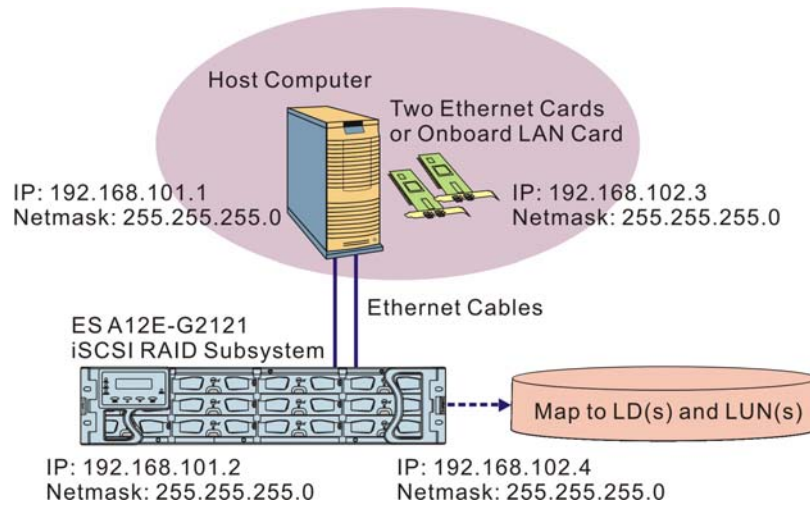
Three network connection diagrams are displayed below. In **Figure 1-1**, the diagram shows the Fibre channel configuration using dual-port Fibre HBA card. **Figure 1-2** demonstrates iSCSI channel configuration using dual-port iSCSI HBA card, while iSCSI channel configuration using Ethernet cards or onboard LAN card is displayed in **Figure 1-3**



**Figure 1-1: Fibre Configuration with Fiber HBA Card**



**Figure 1-2: iSCSI Configuration with iSCSI HBA Card**

**Figure 1-3: iSCSI Configuration with Ethernet Card**

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## Chapter 2

# MPIO Driver Program Installation

Infortrend developed the MPIO driver program capabilities within Microsoft operating systems to provide continuous data access from Infortrend's RAID arrays to host servers. This chapter introduces the installation procedures of the program and how to verify if the program is successfully installed onto your host computer.

### 2.1 The MPIO Program Package

A MPIO program package contains a zipped file, **IFT\_MPIO-1.0.1.301.zip**, is available on the Infortrend download site.

Download the zip file and use programs such as WinZip or WinRAR to unzip the file. Three file folders for different Windows Platform will be seen.

1. Windows x86 edition
2. Windows X64 edition
3. Widows Ia64 edition (Intel Itanium/Itanium2/IPF)

Choose a folder that is the most appropriate to you. When the file folder is opened, two installer files will be seen. Please install the MPIO program follow by the instructions provided below.

## 2.2 Installing the MPIO Driver Program

Before you install the MPIO drive program, make sure your computer system meets the minimum requirements listed in **Section 1.3**. It is recommended that you exit all programs before running the setup program.



### WARNING!

*If you have previous MPIO program installed on the host computer, we strongly recommend that you remove the MPIO program and restart the computer before performing the Infortrend MPIO driver program installation. Install the MPIO program without uninstall the previous version may cause unexpected system result.*

To install MPIO, follow these steps:



**Step 1.** Double-click on the installer file, **install.exe**, to start installation process.



**Step 2.** A **Licenses Announcement** window will appear. Read the announcement carefully.

Figure 2-1: A DOS Screen During MPIO Driver Program Installation



**Step 3.** If you agree the terms and conditions listed, type **Y** and then click **Enter** on the keyboard to install the program onto your host computer.



### NOTE:

*A DOS screen will appear while the program is installing. The DOS screen will automatically close once the installation is completed. It will take approximately a few seconds.*

```
Installing the Multi-Path Device Driver...
Success

Restarting all SCSI adapters...
Success
```

Figure 2-2: A DOS Screen During MPIO Driver Program Installation



**Step 4.** A **Security Alert - Driver Installation** dialog box will prompt during the MPIO driver program installation. (See *Figure 2-3*) Click **Yes** to continue the setup process.



Figure 2-3: Security Alert Dialog Box



**Step 5.** Restart Computer. The MPIO driver program will be installed completed into your computer only after the computer is restarted.

**NOTE:**

*If you like to remove the MPIO driver program in the future, the computer will also need to restart after program removed from the computer.*



**Step 6.** The MPIO driver program is successfully installed onto your host computer. Your storage system is now protected by the multi-path load balance and failover functionalities.

## 2.3 Is the MPIO Program Installed Successfully?

To have the multi-path function running on your Fibre or iSCSI storage network, please make sure the MPIO program is installed successfully. One way you can check if the MPIO program is installed properly for the Fibre series RAID subsystem is through the **Computer Management** window. For iSCSI models, also check the iSCSI initiator that should be installed along with the MPIO driver program.

### 2.3.1 Without iSCSI Initiator installed

To verify if the MPIO program is installed successfully, first open the **Computer Management** window. Click to see the items in the **Device Manager** category in the tree table on the left window. (See **Figure 2-4**)

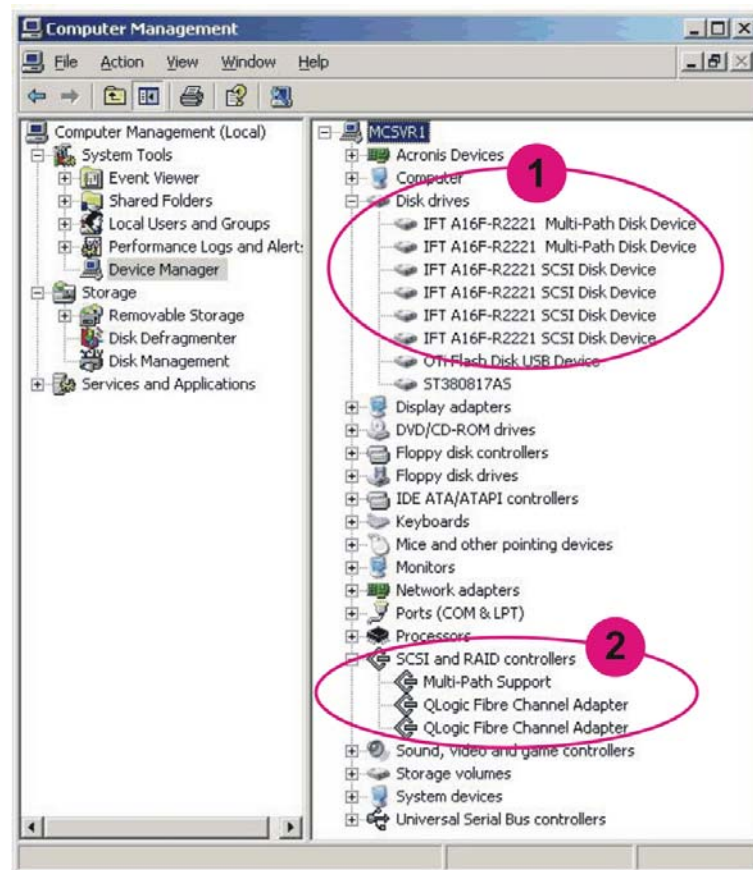


Figure 2-4: Device Manager Tree Table

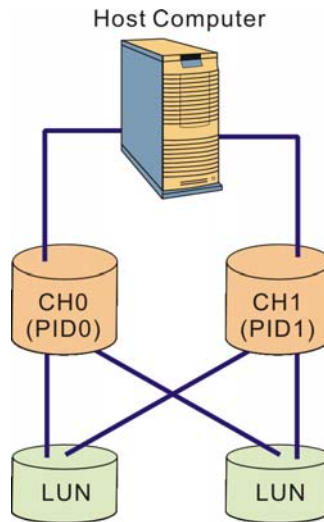
Check the following items:

1. Under **Disk drives** items, one or more **multi-path disk device** should be seen. The number of LUN mappings can vary the number of the multi-path disk device.

The example here uses ES A16F-R2221 RAID subsystem and the subsystem is implemented two logical unit numbers (LUNs.) Since the multi-path is being created, the host computer that is connected to the



RAID controller will read two primary logical drive IDs (PIDs) that has the right to access to two LUNs. (See **Figure 2-5**) The two accesses from the same PID will be recognized as single multi-path disk device by host computer. Therefore, there are two multi-path disk devices (two path to PID0 and PID1) and four hard disk devices shown on the list.



**Figure 2-5: Dual-LUN Multi-path Diagram**

2. Under **Network adapters** items, if you are using two single-port HBA cards or one dual-port HBA card, two server adaptor items will be found. Please note that if you are using two dual-port HBA cards, four server adaptor items should be listed.

### 2.3.2 Without iSCSI Initiator installed

There are one or two ways to verify if the MPIO driver program is installed properly if iSCSI initiator is installed in the host computer.



#### **NOTE:**

*Some iSCSI HBA card and Ethernet card used in the iSCSI storage network require iSCSI initiator installation. Please refer to **Appendix A** for the iSCSI initiator installation instruction.*

### **Solution 1**

Open the **Computer Management** window. Click to see the items in the **Device Manager** category on the tree table. (See **Figure 2-6**) Check the following items:

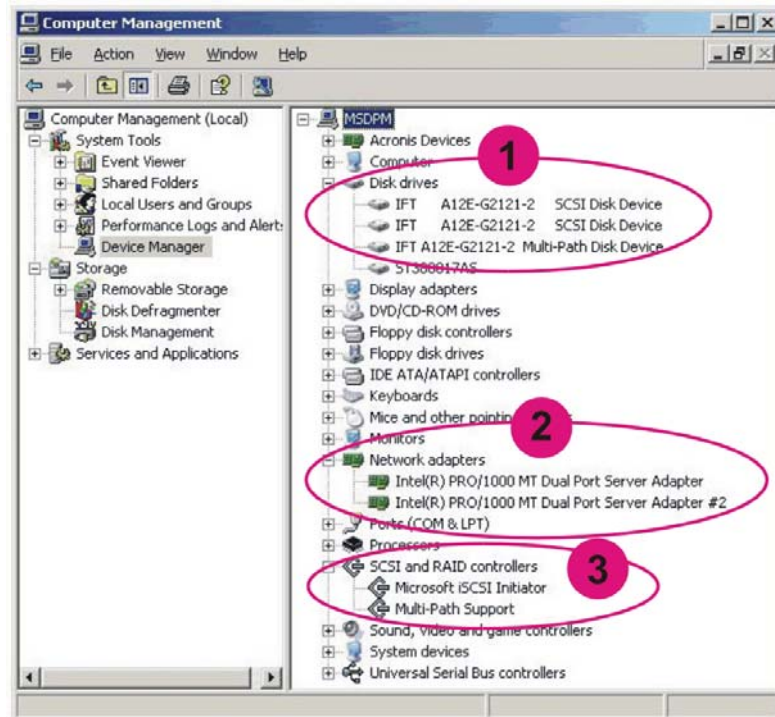
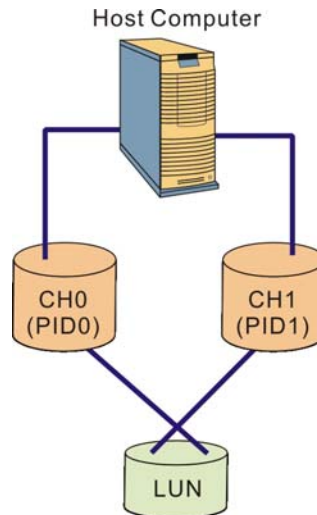


Figure 2-6: Device Manager Tree Table (iSCSI Series)

1. Under **Disk drives** items, one or more **multi-path disk device** should be seen. The number of LUN mappings can vary the number of the multi-path disk device.

The example here uses ES A12E-G2121 RAID subsystem and the subsystem is implemented one logical unit number (LUN.) Since the multi-path is being created, the host computer that is connected to the RAID controller will read two primary logical drive IDs (PIDs) that has the right to access the LUN. (See **Figure 2-7**) The two accesses from the same PID will be recognized as single multi-path disk device by host computer. Therefore, there are only one multi-path disk devices (two path to PID0 and PID1) and two hard disk devices shown on the list.

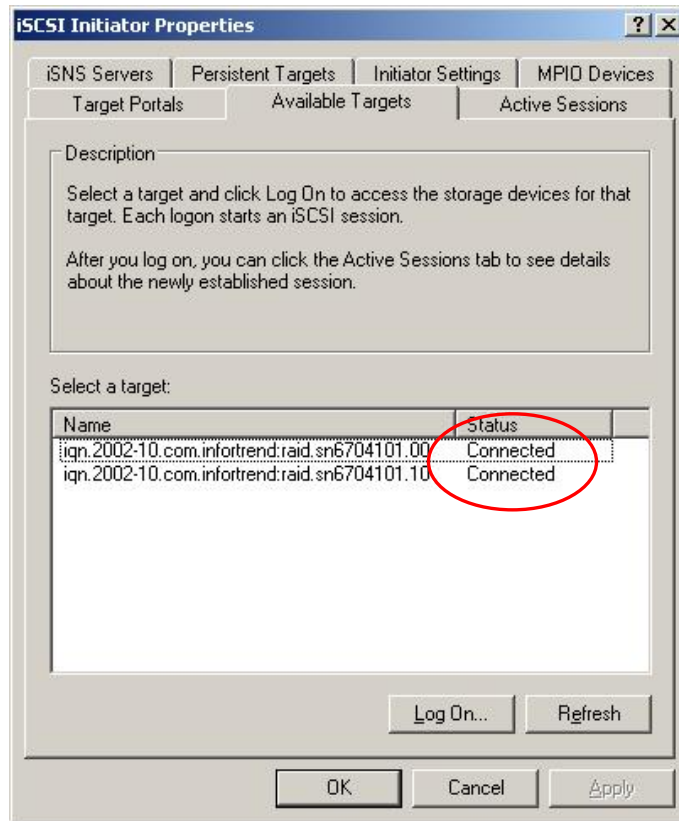


**Figure 2-7: Single-LUN Multi-path Diagram**

2. Under **Network adapters** items, if you are using two single-port HBA cards or one dual-port HBA card, two server adaptor items will be found. Please note that if you are using two dual-port HBA cards, four server adaptor items should be found.
3. Open **SCSI and RAID controllers** item. After the iSCSI initiator is installed, the Microsoft iSCSI initiator and multi-path support will be shown on the list.

## **Solution 2**

Double-click on the iSCSI initiator icon that is located on your Window's desktop. When the iSCSI initiator is opened, click on the **Available Targets** tab. If the multi-path I/O is established, the target status will change from **Inactive** to **Connection**. (See *Figure 2-8*)



**Figure 2-8: The iSCSI Initiator Window**

# Appendix A

## Microsoft iSCSI Initiator Installation

This appendix introduces the Microsoft iSCSI Initiator software and its installation process. Depends on the iSCSI HBA card used on the iSCSI network, the iSCSI initiator software installation maybe required. Please consult your HBA card vendor or refer to its user's manual. Furthermore, if an Ethernet card is used instead of the iSCSI HBA card, it is important to install the iSCSI initiator properly.

For those using an EonStor Fibre-to-Fibre or Fibre-to-SATA series RAID subsystem, no initiator program is required and you may skip this appendix.

### A.1 Microsoft iSCSI Initiator Overview

Microsoft released an iSCSI Software Initiator software driver to integrate multi-path between server and storage for high availability in Window 2003 environment. Use the newest version of Initiator 2.0 will integrate sophisticated iSCSI multi-path functionality and provide numerous supportability and deployment enhancements.

The following sections will explain the iSCSI Initiator installation procedures.

### A.2 Download the iSCSI Initiator

The Microsoft iSCSI Initiator program version 2.0 can be downloaded from Microsoft's official website. The link is shown below:

<http://www.microsoft.com/downloads/filelist>

Three Initiator program files will be seen on the website. Choose the program that is most appropriate for you.

The example shown in the following sections is using “**iSCSI-2.0-x86fre.exe**”


## A.3 Installing the iSCSI Initiator

After downloading the initiator program, install it onto the same host computer where you are going to install the MPIO program.

Double click on the “**iSCSI-2.0-x86fre.exe**” and then follow the on-screen instructions given by its install shield wizard. Be sure to install the complete iSCSI initiator program. Read and agree to all license agreements in order to install the program. Once the installation is completed, exit the installation wizard to return to the Windows desktop.


## A.4 Configure the iSCSI Initiator

After installing the Microsoft iSCSI Initiator program onto your host computer, the program must be correctly configured before installing MPIO software. Please follow the steps below to configure the iSCSI Initiator.

-  **Step 1.** An icon is automatically created onto your Window's desktop during the iSCSI Initiator installation. (See **Figure A-1**) Double-click on the icon to open the initiator program window.



**Figure A-1: Microsoft iSCSI Initiator Icon**

-  **Step 2.** When the program is opened, first click on the **Target Portals** tab and then click on the **Add** button to add new target portals. (See **Figure A-2**)

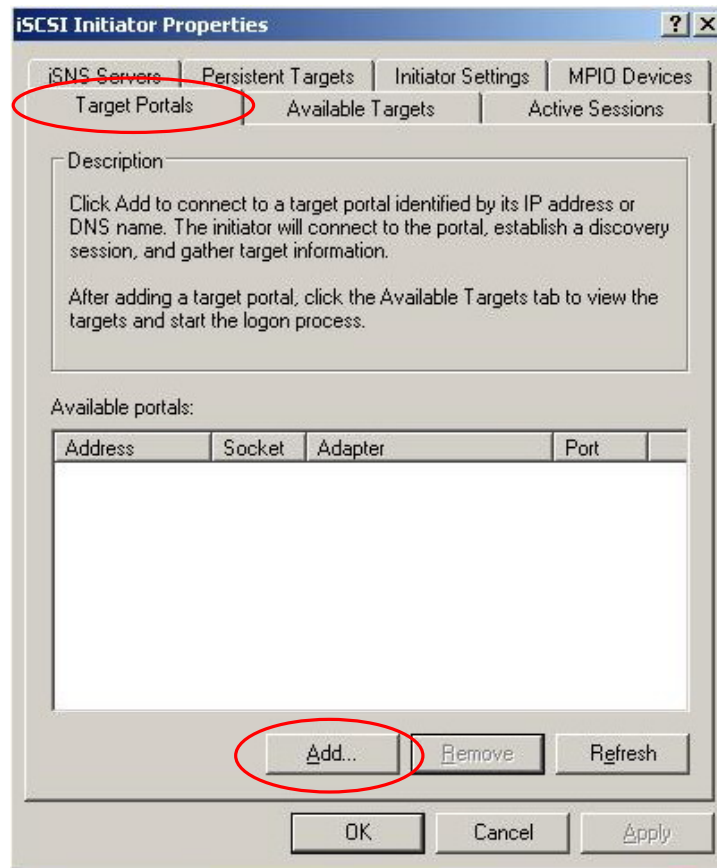


Figure A-2: Target Portal Page on the iSCSI Initiator Window



**Step 3.** When the **Add Target Portal** window prompts, enter your RAID subsystem channel IP address. The channel is the one that connects the iSCSI RAID subsystem to your host computer. Click **OK** to add. (See *Figure A-3*)

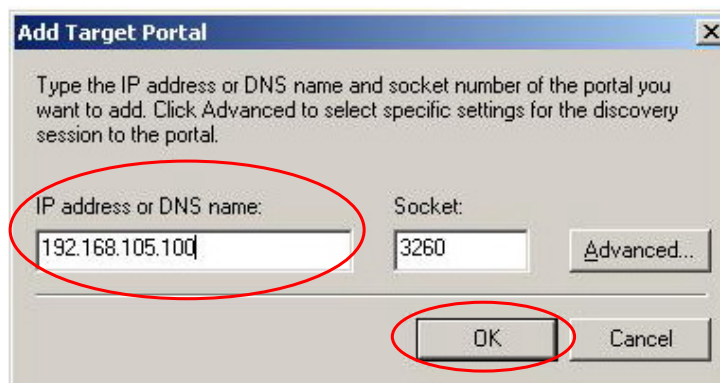


Figure A-3: Adding a Target Portal



**NOTE:**

You can check your iSCSI RAID subsystem channel IP addresses by RS-232 terminal screen or RAIDWatch® Manager software. Please refer to *Generic Manual* or *RAIDWatch User's Manual* that came with your subsystem for detail.



**NOTE:**

Window will automatically generate a socket number that is shown on the right of the IP address input box. It is recommended you keep the socket number without changing it.



**Step 4.** In order to have path redundancy, a dual-channel connection is necessary. Repeat **Step 3** above to add a second target portal for the second channel.



**Step 5.** Click on the **Available Target** tab on the top of the iSCSI Initiator program window, and then click on the **Log On** button.

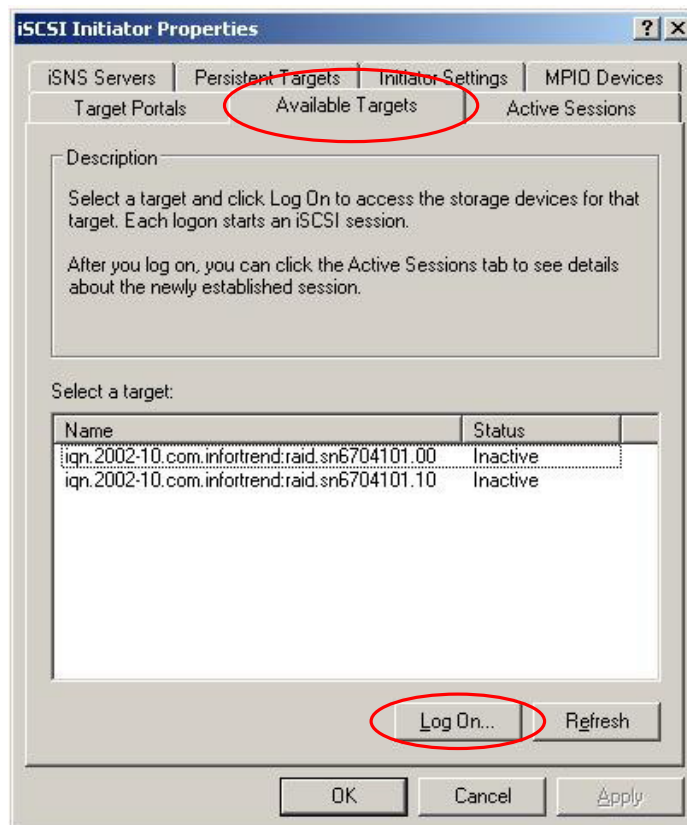



Figure A-4: Available Target Page on the iSCSI Initiator Window



-  **Step 6.** The **Log On to Target** window should be opened as seen in **Figure A-5**. Click on both check boxes to enable the connections to be restored automatically when the system boots and the multi-path connections are complete. Click **OK** to exit this window.

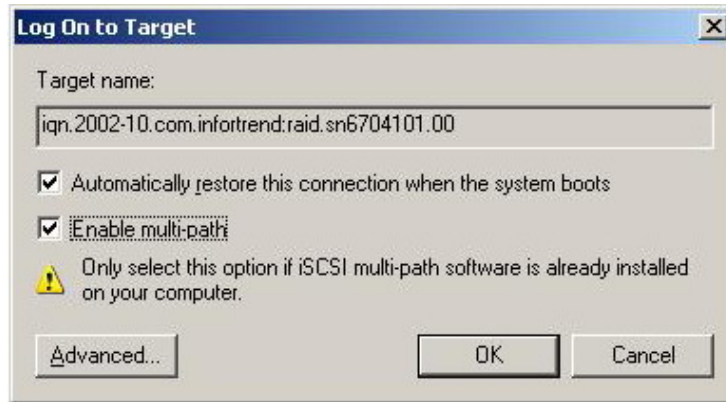



Figure A-5: Log On to Target Window

-  **Step 7.** Return to the **iSCSI Initiator Properties** window. Click **OK** on the bottom of the window to exit the program, and return to the Windows desktop. (See **Figure A-6**)

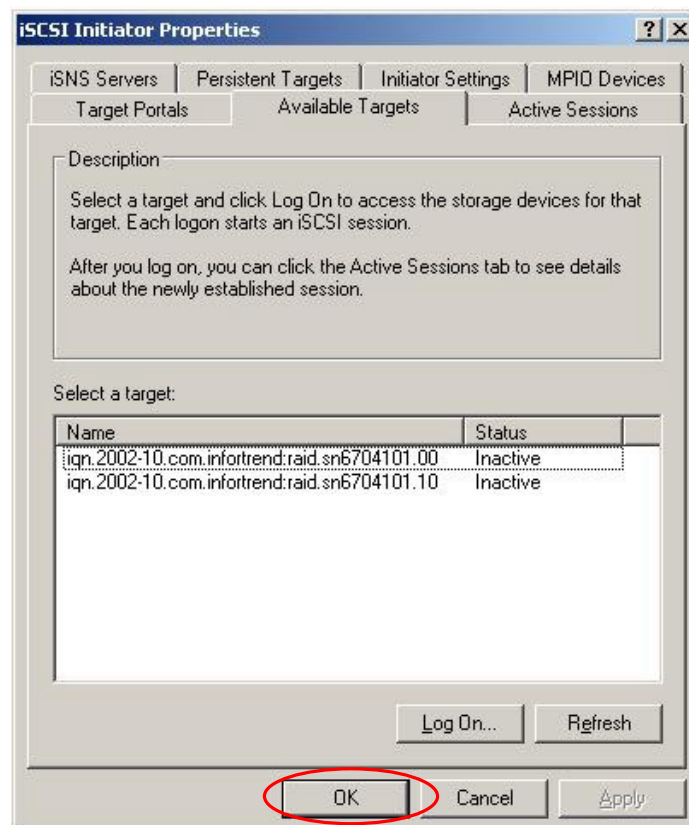



Figure A-6: Existing the iSCSI Initiator Window

-  **Step 8.** On the Windows desktop, right-click on the **My Computer** icon and then select the **Manage** option. (See **Figure A-7**) A **Computer Management** window will be opened.

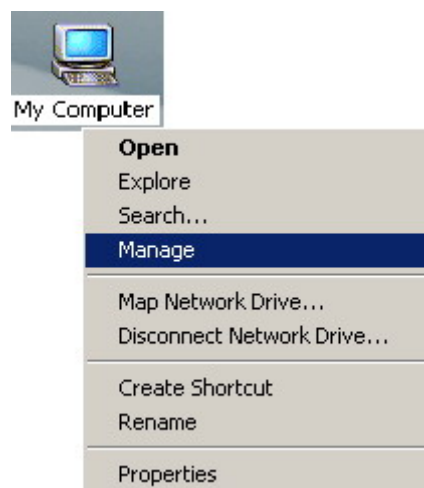



Figure A-7: Manage Option

-  **Step 9.** Click on the **Device Manager** on the tree table located on the left side of the **Computer Management** window. The single or multiple logical drives of the EonStor RAID subsystem should be detected and the Microsoft iSCSI Initiator program should be installed properly as seen in *Figure A-8* below.

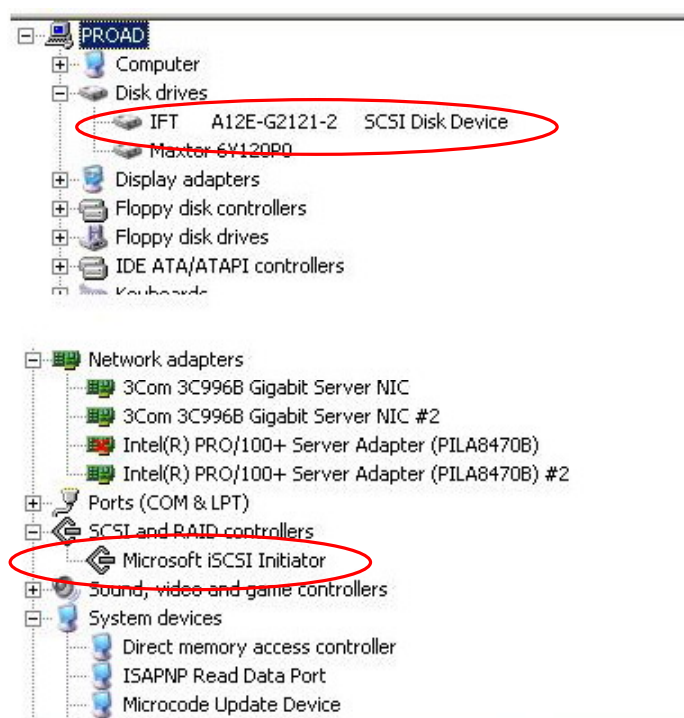


Figure A-8: Device Manager Tree Table